

## Vertical Bloch Line Storage Technology

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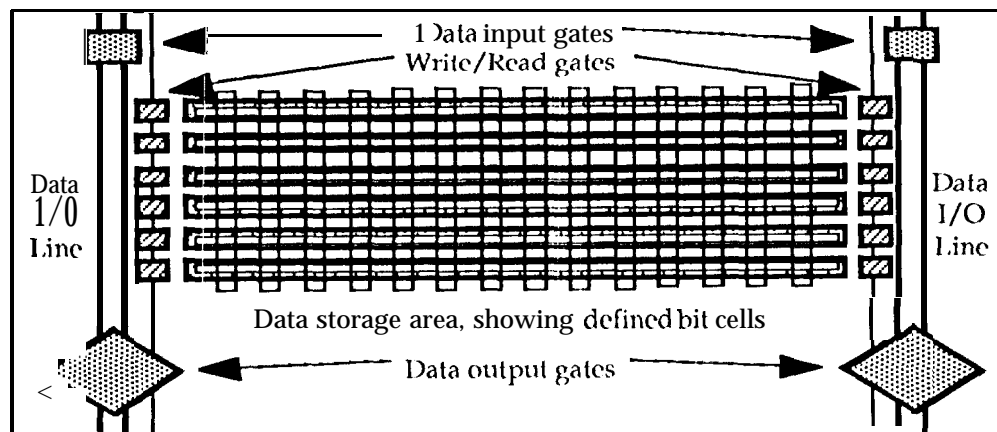
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Vertical Bloch Line (VBL) storage is an emerging technology which has the potential for offering a number of desired data storage attributes in a single chip. VBL technology<sup>1,2,3</sup> potentially offers high areal storage density, ranging, as shown in Table 1, from 25 Mbits/cm<sup>2</sup> to greater than 1 Gbit/cm<sup>2</sup>. In addition, VBL technology offers nonvolatility and reduced power consumption, radiation hardness, and rapid mass erasability. Current activities are aimed at integrating storage chip functions into prototype chips with capacities of 16 Mbits to 256 Mbits over the next 1 to 3 years. As shown in Figure 1, data are stored in a VBL chip using the presence or absence of micromagnetic VBL pairs in bit cells defined along magnetic domain walls. Data are written into the chip and placed into the magnetic data storage domain walls using a current-access major line and write gates. Data are read from the magnetic data storage domain walls using read gates which are common to the write gates, and are amplified and read out of the chip by a magnetoresistive sensor.

Table 1. Potential Vertical Bloch Line Storage Density Performance:

Magnetic Storage Domain Width	Lithography: 1 $\mu\text{m}$	Lithography: 0.5 $\mu\text{m}$	Lithography: 0.25 $\mu\text{m}$	Lithography: 0.1 $\mu\text{m}$
5 $\mu\text{m}$	10 Mbits/cm <sup>2</sup>	20 Mbits/cm <sup>2</sup>	40 Mbits/cm <sup>2</sup>	100 Mbits/cm <sup>2</sup>
2 $\mu\text{m}$	25 Mbits/cm <sup>2</sup>	50 Mbits/cm <sup>2</sup>	100 Mbits/cm <sup>2</sup>	250 Mbits/cm <sup>2</sup>
1 $\mu\text{m}$	50 Mbits/cm <sup>2</sup>	100 Mbits/cm <sup>2</sup>	200 Mbits/cm <sup>2</sup>	500 Mbits/cm <sup>2</sup>
0.5 $\mu\text{m}$	100 Mbits/cm <sup>2</sup>	200 Mbits/cm <sup>2</sup>	400 Mbits/cm <sup>2</sup>	1,000 Mbits/cm <sup>2</sup>
0.25 $\mu\text{m}$	200 Mbits/cm <sup>2</sup>	400 Mbits/cm <sup>2</sup>	800 Mbits/cm <sup>2</sup>	2,000 Mbits/cm <sup>2</sup>

Figure 1. Schematic VBL architecture



### References and Acknowledgment:

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